REMARKS

Applicants submit this Amendment in reply to the Office Action mailed March 23, 2004. In this Amendment, Applicants cancel claims 1 and 17 -21 to expedite prosecution of this application. Before entry of this Amendment, claims 1 and 17-26 were pending in this application. After entry of this Amendment, claims 22-26 are pending in this application.

In the Office Action, the Examiner rejected claims 1 and 17-19 under 35 U.S.C. § 102(b) as being unpatentable under U.S. Patent No. 3,769,122 to Coddington et al. ("Coddington"); rejected claims 20 and 21 under 35 U.S.C. § 103(a) as being unpatentable over Coddington; and rejected claims 22 –26 under 35 U.S.C. § 103(a) as being unpatentable over Coddington in view of Japanese Application (Kokai) No. 5-278409 to Yamakawa ("Yamakawa.")[1]

Applicants respectfully traverse the Examiner's rejection of claims 1 and 17-26 for at least the reasons discussed below.

Claim Rejections Under 35 U.S.C. § 102(b)

Applicants respectfully transverse the Examiner's rejection of claims 1 and 17-19, which were rejected under 35 U.S.C. 102(b) as being anticipated by Coddington. Since these claims have been canceled however, Applicants respectfully submit that this rejection is now moot.

[1] For the Examiner's convenience an English language translation of Yamakawa is attached hereto. Portions of the Yamakawa translation are referenced below.

Claim Rejections Under 35 U.S.C. § 103(a)

Applicants respectfully traverses the Examiner's rejection of claims 20 and 21 under 35 U.S.C. § 103(a) as being unpatentable over Coddington, and submit that this rejection is now moot in light of Applicant's cancellation of these claims.

Applicants respectfully traverse the Examiner's rejection of claims 22 –26 under 35 U.S.C. § 103(a) as being unpatentable over Coddington in view of Yamakawa.

To establish a prima facie case of obviousness over a single reference or a combination of references, the Examiner "bears the initial burden of factually supporting any prima facie conclusion of obviousness." *Cf. In re Fine*, 837 F.2d 1071, 1074 (Fed. Cir. 1988). Specifically, the Examiner must prove such a desire to combine references with "substantial evidence" that is a result of a "thorough and searching" factual inquiry. *In re Lee*, 277 F.3d 1338, 1343-1344 (Fed. Cir. 2002). The Federal Circuit has on numerous occasions stated that to establish a prima facie case of obviousness an Examiner must show that the references, taken alone or in combination, (1) teach all the present claim limitations; (2) would have suggested to or provided motivation for one of ordinary skill in the art to make the claimed invention; and (3) would have provided one of ordinary skill with a reasonable expectation of success in so making. *See In re Vaeck*, 20 U.S.P.Q.2d 1438, 1442 (Fed. Cir. 1991) (*citing In re Dow Chemical Co.*, 837 F.2d 469, 473, 5 U.S.P.Q.2d 1529, 1531 (Fed. Cir. 1988)). "Both the suggestion and the reasonable expectation of success must be found in the prior art reference, not in the applicant's disclosure." *In re Vaeck* at 1442 (emphasis added).

In the present case, Applicants respectfully submit that the Examiner has failed to establish a prima facie case of obviousness because the Examiner has not shown that Coddington and Yamakawa, whether alone or in combination, either (1) teach all the present claim

limitations; (2) suggest a motivation for one of ordinary skill in the art to modify their teachings to make the claimed invention; or (3) provide one of ordinary skill with a reasonable expectation of success in so combining and/or modifying their teachings. *See also,* M.P.E.P. §§2143.01, 2143.02, & 2143.03.

1. The prior art does not teach all the present claim limitations

As discussed above and incorporated by reference herein in full, Coddington fails to teach or suggest each and every limitation of claim 22, for example. The Examiner concedes that Coddington "lacks a clear showing that the treatment would comprise applying a second elastomer layer comprising a polymeric base in an aqueous emulsion." Office Action, page 3. Additionally, Coddington at least fails to teach a showing of the treatment comprising a vulcanizing system as required by claim 22, and specifically that the vulcanizing system comprises vulcanization accelerators as required by claims 25 and 26.

Applicant submits that nothing in Yamakawa corrects these deficiencies of Coddington. Yamakawa does not teach the use of a sulfur-curable polymeric base and a vulcanization system in an aqueous emulsion nor does Yamakawa teach the use of vulcanization accelerators. Rather, Yamakawa teaches that "the inner layer can be provided ... by... coating of a solution or water based emulsion... on the inner surface of a green tire configured from a non-vulcanizing rubber, and then the vulcanization of the green tire using a common method" (page 7, lines 8-16, of the attached English translation). Thus, no reference is found in Yamakawa to either any sulfur-curable polymeric base and vulcanizing system in the aqueous solution, or to any pre-vulcanizing step achieved in the inner-layer. Accordingly, Applicants submit that this rejection is improper under M.P.E.P. § 2143.03 and respectfully request that it be withdrawn.

2. There is no suggestion or motivation for one in the art to make the claimed invention

Applicants submit that the Examiner cannot demonstrate a suggestion or motivation to modifiy the teachings of Coddington and Yamakawa to make the claimed invention. The Examiner has a duty to make explicit factual findings as evidence of a motivation for making a claimed invention. *See In re Lee*, 277 F.3d 1338, 1343 (Fed. Cir. 2002). Indeed, these factual findings must be "clear and particular." *In re Dembiczak*, 175 F.3d 994, 999, 50 U.S.P.Q.2d 1614, 1617 (Fed. Cir. 1999).

Coddington does not teach or even suggest a motivation to modify its teachings to use an aqueous emulsion as opposed to a solvent. Coddington does not suggest that there is any problem that needs correction or any advantage that could be obtained by modifying the disclosed method for providing an inner liner to a tire. In fact, Coddington states that use of an organic solvent is the preferred method for treating the tire (col. 6, lines 6- 24). In the absence of

such a teaching, one skilled in the art would not have been motivated to modify the teachings of Coddington in an attempt to arrive at the presently claimed invention.

Again, Yamakawa does not remedy the deficiencies of Coddington, either singly or in combination with Coddington. Yamakawa does not provide any suggestion or motivation to create a treatment comprising a sulfur-curable polymeric base and a vulcanizing system in an aqueous emulsion, as required by the present claims. Yamakawa is directed toward polymeric inner liner to lighten the weight of a tire (page 4, lines 14 –18 of the attached English translation). Therefore, Yamakawa discloses a solution to a different technical problem then either the present invention or Coddington.

Moreover, Yamakawa expressly teaches away from Applicants' claimed combination, as recited in claim 22. It is well-settled that claims are not obvious if the cited reference or other relevant art teaches away from the claimed invention. M.P.E.P. § 2145(X)(D)(1). Indeed, the Federal Circuit has held a prior art reference must be considered in its entirety, and one may not "disregard[] disclosures in the references that diverge from and teach away from the invention at hand." *W.L. Gore & Assocs., Inc., v. Garlock, Inc.*, 721 F.2d 1540, 1550 (Fed. Cir. 1983); *see also, Bausch & Lomb, Inc., v. Barnes-Hind/Hydrocurve, Inc.*, 796 F.2d 443, 448 (Fed. Cir. 1986). Thus, the Examiner must consider the entire disclosure of Yamakawa, including those portions that are inconsistent with his asserted position. *See In re Kotzab*, 217 F.3d 1365, 1370 (Fed. Cir. 2000) ("a rejection cannot be predicated on the mere identification in [a prior art reference] of individual components of claimed limitations").

Central to Yamakawa is a inner liner configured from a vinylidene chloride-vinyl chloride copolymer (page 4, lines 23- 29 of the attached English translation). Indeed, Yamakawa teaches that utilizing a vinylidene chloride-vinyl chloride copolymer is superior to butyl rubber.

Id. Yamakawa specifically teaches that the use of butyl rubber is inadequate because of the imperfect air-impermeability of butyl rubber (page 4, lines 5-12 of the attached English translation). Thus, Yamakawa teaches away from using a sulfur-curable polymeric base (butyl rubber in this case) as required by claim 22.

Applicants therefore respectfully submit that Coddington and Yamakawa are not combinable in the manner proposed by the Examiner, since neither teach or suggest the claimed treatment which "comprises at least one layer of a second elastomer material comprising a sulfur-curable base and a vulcanizing system in an aqueous emulsion." Instead, as noted above, Yamakawa teaches away from the claimed method. Accordingly, Applicants assert that the present rejections should be withdrawn for this reason as well.

3. There is no evidence of a reasonable expectation of success

In addition to showing a motivation to modify/combine the prior art references to make the claimed invention, the Examiner must show why a person of ordinary skill in the art would have had a reasonable expectation of success for such a modification/combination. *See, e.g.,* M.P.E.P. §2143.02.

Applicants respectfully note that the Office Action does not address whether one of ordinary skill would have a reasonable expectation of success in combining the applied references in the manner proposed by the Examiner. Moreover, in light of the above-described shortcomings of both Coddington and Yamakawa, Applicants respectfully submit that one of ordinary skill could not reasonably expect to successfully combine these references to obtain the claimed invention. At least for these reasons also, Applicants submit that claim 22 is allowable over the applied references.

Applicants further note that claim 25 recites a vulcanization accelerator. Since both Coddington and Yamakawa are silent as to this claimed feature, Applicants submit that claim 25, as well as claims 23, 24, and 26 are allowable at least due to their dependence from claim 22.

In view of the foregoing, Applicants respectfully submit that the Examiner has failed to establish a prima facie case of obviousness pursuant to M.P.E.P. § 2143.02, and respectfully request that the 35 U.SC. § 103 rejection of claims 22 –25 be withdrawn.

If there is any fee due in connection with the filing of this Preliminary Amendment, please charge the fee to our Deposit Account No. 06-0916.

Respectfully submitted,

FINNEGAN, HENDERSON, FARABOW,
GARRETT & DUNNER, L.L.P.

Dated: July 22, 2004

By: _____
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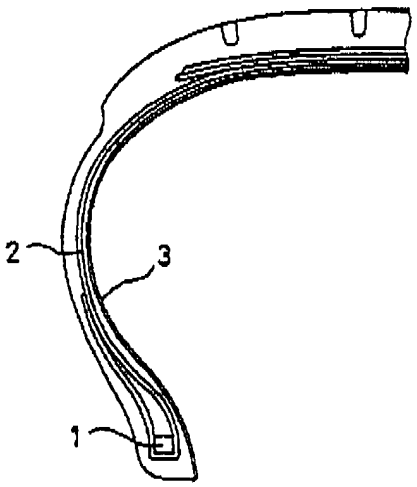
(54) [Title of the Invention] Pneumatic tire and method for the manufacture of said

(57) [Abstract]
[Objective] To provide a pneumatic tire and method for the manufacture of said in which weight-lightening is achieved without loss of air-pressure retainability.
[Configuration] By the lamination of a thin film formed from a vinylidene chloride-vinyl chloride copolymer or the spraying or coating of a solution or water-based emulsion of the vinylidene chloride-vinyl chloride copolymer on the inner side of a green tire configured from a non-vulcanized rubber in advance, and then the vulcanization of the green tire, an inner-liner layer 3 configured from a vinylidene chloride-vinyl chloride copolymer is provided on the inner side of the tire.



[Scope of the Patent Claims]

[Claim 1] Pneumatic tire in which an inner-liner layer on the inner side of the tire is configured from a vinylidene chloride-vinyl chloride copolymer.

[Claim 2] Method for the manufacture of a pneumatic tire in which, as an inner-liner layer, a thin film formed from a vinylidene chloride-vinyl chloride copolymer is laminated on the inner side of a green tire configured from a non-vulcanized rubber, and said green tire is then vulcanized.

[Claim 3] Method for the manufacture of a pneumatic tire in which, as an inner-liner layer, a solution or water-based emulsion of a vinylidene chloride-vinyl chloride copolymer is sprayed or coated on the inner side of a green tire configured from a non-vulcanized rubber, and said green tire is then vulcanized.

[Detailed Description of the Invention]

[0001]

[Field of Industrial Utilization] The present invention relates to a pneumatic tire and method for the manufacture of said in which weight-lightening is achieved without loss of air-pressure retainability.

[0002]

[Prior Art] Reduction of the rate of fuel consumption is one of the most significant technological issues that pertains to motor vehicles, and the weight-lightening of a pneumatic tire represents one measure for dealing with this issue for which there has been an ever-strengthening demand. Incidentally, an inner-liner layer configured from an air-impermeable rubber such as butyl rubber is provided on the inner surface of the pneumatic tire in order to maintain the air pressure of the pneumatic tire at a constant. However, because of its poor affinity with other

rubbers, the adhesion of butyl rubber to the inner-surface rubber of the carcass layer is inadequate. For this reason, because the two component rubbers are generally joined by way of a rubber sheet known as tie rubber that serves as an intermediary composition between the inner-surface rubber and butyl rubber and, because of the imperfect air-impermeability of the butyl rubber, a rubber layer of a thickness of at least several hundred μm must be formed in order to maintain the necessary tire air pressure. Accordingly, the thickness of the layer that is made up of the thickness of the butyl rubber and the thickness of the tie rubber exceeds 1mm (1000μm), and this is one factor in the increased weight of a manufactured tire.

[0003]

[Problems to be Solved by the Invention] The objective of the present invention is to provide a pneumatic tire and method for the manufacture of said in which weight-lightening is achieved without loss of air-pressure retainability.

[0004]

[Means to Solve the Problems] The pneumatic tire of the present invention is characterized in that, in order to achieve the above-noted objective, the inner-liner layer of the inner side of the tire is configured from a vinylidene chloride-vinyl chloride copolymer. By virtue of the fact that the vinylidene chloride-vinyl chloride copolymer has very good air-impermeability and an air permeability that is comparatively lower than butyl rubber, the thickness of the inner-liner layer can be made thinner than has hitherto been possible in the prior art by using this as the constituent material of the inner-liner layer. Accordingly,

a reduction in tire weight can be achieved without loss of the air-pressure retainability.

[0005] Although the inner-liner layer of the present invention is arranged on the inner side of the tire, it may also be arranged on either the inner side or the outer side of the carcass layer. When, in the method for the manufacture of the pneumatic tire of the present invention, the inner-liner layer is arranged on the inner side of the carcass layer, by the lamination of a thin film formed from a vinylidene chloride-vinyl chloride copolymer or the spraying or coating of a solution or water-based emulsion of the vinylidene chloride-vinyl chloride copolymer on the inner side of a green tire configured from a non-vulcanized rubber in advance, and then the vulcanization of the green tire, a pneumatic tire can be manufactured in which the above-described weight-lightening is achieved. By virtue of the fact that, in this case, because of its very good adhesion characteristics with rubber, the vinylidene chloride-vinyl chloride copolymer is integrally attached to the inner surface rubber during vulcanization by lamination on the inner surface of the green tire in a thin film state or coating on the inner surface of the green tire in the solution or water-based emulsion state, there is no need, unlike the prior art, for the use of a tie rubber, and this contributes to the weight-lightening of the tire.

[0006] On the other hand, when the inner-liner layer is arranged on the outer side of the carcass layer, a thin film formed from the vinylidene chloride-vinyl chloride copolymer is laminated or a solution or water-based emulsion of the vinylidene chloride-vinyl chloride copolymer is sprayed or coated on the outer surface of the carcass member prior to the formation of the green tire,

wherein the green tire is formed in such a way that the above-described laminated surface or coated surface of said carcass member is formed on the outer side of the tire, and then the green tire is vulcanized. In this case as well, similarly to the case described above, there is no need for the use of a tie rubber.

[0007] A detailed description is given below, with reference to the attached diagrams, of the configuration of the present invention. Figure 1 is a cross-sectional view in the meridian direction that depicts the pneumatic tire of the present invention. In Figure 1, a carcass layer 2 is provided between a pair of left and right bead cores 1, 1, and an inner-liner layer 3 is provided on the inner surface of the tire on the inner side of the carcass layer 2. The inner-liner layer 3 is configured from a vinylidene chloride-vinyl chloride copolymer.

[0008] Although the vinylidene chloride-vinyl chloride copolymer of the present invention has the fundamental structure as described below, there are no particular limitations to the mode of orientation of the monomer units in the molecule and a variety of arrangements, including that of a random copolymer or a block copolymer, can be adopted.

[0009]

$[CH_2 - CCl_2]_m [CH_2 - CHCl]_n$

The copolymerization ratio of the monomer units of the vinylidene chloride-vinyl chloride copolymer to be used is preferably vinylidene chloride: vinyl chloride = 50:50 - 85:15(mol%). By virtue of the fact that air permeability increases when a copolymerization ratio of vinylidene chloride of less than 50mol% is used, the thickness of the inner-liner layer configured from the vinylidene chloride-

vinyl chloride copolymer must be increased to bring about the necessary air-impermeability. Conversely, when the copolymerization ratio of vinylidene chloride exceeds 85mol%, the chemical stability with respect to heat and light is lowered, and miscibility with respect to a range of thermoplastics is also lowered.

[0010] In the manufacture of the pneumatic tire of the present invention as described above, an inner-liner layer 3 can be provided on the inner surface of the tire on the inner side of the carcass layer 2 by the lamination of a thin film configured from vinylidene chloride-vinyl chloride copolymer or the spraying or coating of a solution or water-based emulsion of the vinylidene chloride-vinyl chloride copolymer on the inner surface of a green tire configured from a non-vulcanized rubber, and then the vulcanization of the green tire using a common method. In this case, it is preferable that the thickness of the thin film or coated film configured from the vinylidene chloride-vinyl chloride copolymer be 10 to 50μm. Air leakage can be effectively prevented and air pressure can be held constant by forming the thin film or coating in a thickness of no less than 10μm. In addition, by forming the thin film or coating in a thickness of no more than 50μm, the optimum flexibility of the inner-liner layer is ensured.

[0011] The vinylidene chloride-vinyl chloride copolymer solution of the present invention refers to this polymer dissolved in an organic solution such as, for example, methyl alcohol, ethyl alcohol, propyl alcohol, butyl alcohol, benzyl alcohol and diethylene glycol monomethyl ethyl (DGME). In addition, the water-based emulsion of the above-noted polymer refers to, in the manufacture of the

above-noted polymer by emulsion-polymerization, the reaction system prior to recovery of the polymer.

[0012]

[Practical Examples] Tires 1,2 of the present invention and a comparative tire of the configuration shown in Figure 1 of tire size 185/70R14 but with respectively different inner-liner layers as described below were manufactured, and air leakage tests were conducted on the three tire types. The results thereof and weight of the inner-liner layers are shown in Table 1.

Tire 1 of the present invention: This tire was formed by the lamination of a thin film of vinylidene chloride-vinyl chloride copolymer (vinylidene chloride 85 mol%) of thickness 20μm to form the inner-liner layer on the inner surface of a green tire, and then the vulcanization of the green tire.

Tire 2 of the present invention: This tire was formed by the dissolving of vinylidene chloride-vinyl chloride copolymer (vinylidene chloride 85mol%) in methyl glycol in a concentration of 20 wt.%, the coating of this solution on the inner surface of a green tire to form an inner-liner layer in such a way that the thickness of the inner-liner layer when dried was approximately 20μm, and then the vulcanization of the green tire.

Comparative tire: This tire was formed by the provision on the inner surface of a green tire, by way of a tie rubber of approximately 700μm thickness, of an inner-liner layer of approximately 500μm thickness configured from a non-vulcanized butyl rubber, and then the vulcanization of the green tire.

Air-leakage test: After mounting of the tires (stationary state) at room temperature 21°C on a standard rim, the tires were let stand for 48 hours at inner pressure 2.0kgf/cm^2, whereupon the inner pressure of the tires was re-adjusted to 2.0kgf/cm^2. Taking the point immediately following re-adjustment as the initial point of measurement, the inner pressure was measured every 48 hours for 3 months.

[0013] The measured data obtained in this way was recursed to $y^{-\beta t}$ by a method of least squares wherein, taking t = time (days), y = inner pressure (measured inner pressure/2.0), an air leakage coefficient B was obtained. In addition, substituting t = 30 days, an inner pressure reduction rate (Z) per month was calculated in accordance with the equation noted below.

[0014]

$Z\ (\%/\text{month}) = (1-e^{-\beta \times 30}) \times 100$

[0015]

Table 1

	Tire 1 of the present invention	Tire 2 of the present invention	Comparative tire
Constituent material of the inner-liner layer	Vinylidene chloride-vinyl chloride copolymer		Butyl rubber (interposed tie rubber)
Inner pressure reduction rate Z	2.4	2.4	2.6
Weight of inner-liner layer (g)	Approx. 20	Approx. 20	Approx. 650

As is clear from Table 1, despite the fact that the thickness of the inner-liner layer of tires 1, 2 was approximately 1/25 that of the butyl rubber inner-liner layer of the comparative tire, the tires 1, 2 of the present invention displayed an air-pressure retainability approximately identical to the comparative tire. In

addition, in contrast to the fact that the total weight of the inner-liner layer and tie rubber layer in the comparative tire was approximately 650g, the weight of the inner-liner layer of the tires 1, 2 of the present invention was approximately 20g, wherein a weight-lightening equivalent to approximately 1/30 of the comparative tire was achieved.

[0016]

[Effect of the Invention] Using the pneumatic tire of the present invention as described above, because the inner-liner layer on the inner side of the tire is configured from a vinylidene chloride-vinyl chloride copolymer that has better air-impermeability, the thickness of the inner-liner layer can be formed thinner than the prior art wherein, without loss of air-pressure retainability, a weight-lightening of the tire weight can be achieved.

[0017] In addition, using the method for the manufacture of the pneumatic tire of the present invention, by the lamination of a thin film formed from a vinylidene chloride-vinyl chloride copolymer, or the spraying or coating of a solution or water-based emulsion of the vinylidene chloride-vinyl chloride copolymer in advance as an inner-liner layer on the inner surface of a green tire configured from a non-vulcanized rubber, and then the vulcanization of the green tire, an excellent tire like that described above can be manufactured without the need for the use of a tie rubber.

[Brief Description of the Diagrams]

[Figure 1] is a cross-sectional diagram in the meridian direction of the main part of the pneumatic tire of the present invention.

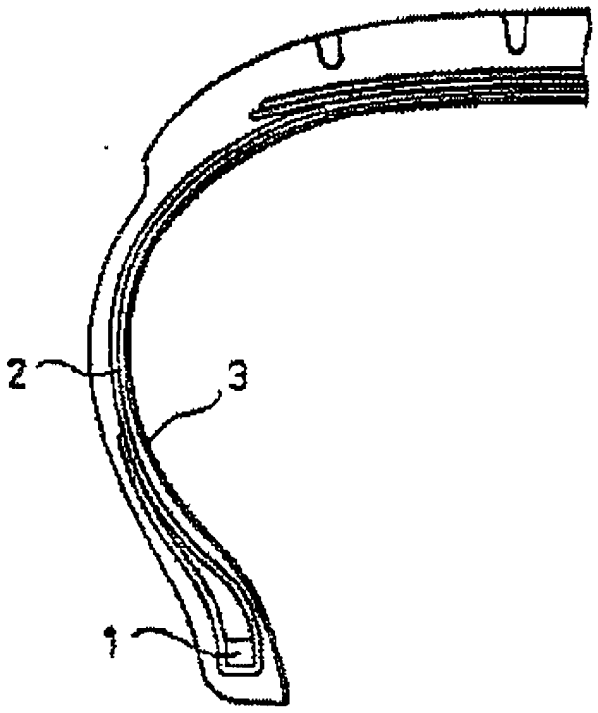
[Explanation of Symbols]

1 Bead rubber

2 Carcass layer

3 Inner-liner layer

Fig. 1



[Procedural Amendment Form]

[Date Submitted] 8th May 1992

[Procedural Amendment 1]

[Title of Document Subject to Amendment] Specification

[Item Subject to Amendment] Claim 3

[Method of Amendment] Alteration

[Details of Amendment]

[Claim 3] Method for the manufacture of a pneumatic tire in which, as an inner-liner layer, a water-based emulsion of a vinylidene chloride-vinyl chloride copolymer is sprayed or coated on the inner side of a green tire configured from a non-vulcanized rubber, and said green tire is then vulcanized.

[Procedural Amendment 2]

[Title of Document Subject to Amendment] Specification

[Item Subject to Amendment] 0005

[Method of Amendment] Alteration

[Details of Amendment]

[0005] Although the inner-liner layer of the present invention is arranged on the inner side of the tire, it may also be arranged on either the inner side or the outer side of the carcass layer. When, in the method for the manufacture of the pneumatic tire of the present invention, the inner-liner layer is arranged on the inner side of the carcass layer, by the lamination of a thin film formed from a vinylidene chloride-vinyl chloride copolymer or the spraying or coating of a water-based emulsion of the vinylidene chloride-vinyl chloride copolymer on the inner side of a green tire configured from a non-vulcanized rubber in advance, and then the vulcanization of the green tire, a pneumatic tire can be manufactured in which the above-described weight-lightening is achieved. By virtue of the fact that, in this case, because of its very good adhesion characteristics with rubber, the vinylidene chloride-vinyl chloride copolymer is integrally attached to the inner surface rubber during vulcanization by lamination on the inner surface of the green tire in a thin film state

or coating on the inner surface of the green tire in the water-based emulsion state, there is no need, unlike the prior art, for the use of a tie rubber, and this contributes to the weight-lightening of the tire.

[Procedural Amendment 3]

[Title of Document Subject to Amendment] Specification

[Item Subject to Amendment] 0006

[Method of Amendment] Alteration

[Details of Amendment]

[0006] On the other hand, when the inner-liner layer is arranged on the outer side of the carcass layer, a thin film formed from the vinylidene chloride-vinyl chloride copolymer is laminated or a water-based emulsion of the vinylidene chloride-vinyl chloride copolymer is sprayed or coated on the outer surface of the carcass member prior to the formation of the green tire, wherein the green tire is formed in such a way that the above-described laminated surface or coated surface of said carcass member is formed on the outer side of the tire, and then the green tire is vulcanized. In this case as well, similarly to the case described above, there is no need for the use of a tie rubber.

[Procedural Amendment 4]

[Title of Document Subject to Amendment] Specification

[Item Subject to Amendment] 0009

[Method of Amendment] Alteration

[Details of Amendment]

[0009]

$$-[CH_2 - CCl_2]_m -[CH_2 - CHCl]_n-$$

The copolymerization ratio of the monomer units of the vinylidene chloride-vinyl chloride copolymer to be used is preferably vinylidene chloride: vinyl chloride = 50:50 -

85:15(mol%). By virtue of the fact that air permeability increases when a copolymerization ratio of vinylidene chloride of less than 50mol% is used, the thickness of the inner-liner layer configured from the vinylidene chloride-vinyl chloride copolymer must be increased to bring about the necessary air-impermeability. Conversely, when the copolymerization ratio of vinylidene chloride exceeds 85mol%, the chemical stability with respect to heat and light is lowered, and miscibility with respect to a range of thermoplastics is also lowered.

[Procedural Amendment 5]

[Title of Document Subject to Amendment] Specification

[Item Subject to Amendment] 0010

[Method of Amendment] Alteration

[Details of Amendment]

[0010] In the manufacture of the pneumatic tire of the present invention as described above, an inner-liner layer 3 can be provided on the inner surface of the tire on the inner side of the carcass layer 2 by the lamination of a thin film configured from vinylidene chloride-vinyl chloride copolymer or the spraying or coating of a water-based emulsion of the vinylidene chloride-vinyl chloride copolymer on the inner surface of a green tire configured from a non-vulcanized rubber, and then the vulcanization of the green tire using a common method. In this case, it is preferable that the thickness of the thin film or coated film configured from the vinylidene chloride-vinyl chloride copolymer be 10 to 50μm. Air leakage can be effectively prevented and air pressure can be held constant by forming the thin film or coating in a thickness of no less than 10μm. In addition, by forming the thin film or coating in a

thickness of no more than 50μm, the optimum flexibility of the inner-liner layer is ensured.

[Procedural Amendment 6]

[Title of Document Subject to Amendment] Specification

[Item Subject to Amendment] 0011

[Method of Amendment] Alteration

[Details of Amendment]

[0011] The water-based emulsion of the above-noted polymer of the present invention refers to, in the manufacture of the above-note polymer by emulsion-polymerization, the reaction system prior to recovery of the polymer.

[Procedural Amendment 7]

[Title of Document Subject to Amendment] Specification

[Item Subject to Amendment] 0012

[Method of Amendment] Alteration

[Details of Amendment]

[0012]

[Practical Examples] Tires 1, 2 of the present invention and a comparative tire of the configuration shown in Figure 1 of tire size 185/70R14 but with respectively different inner-liner layers as described below were manufactured, and air leakage tests were conducted on the three tire types. The results thereof and weight of the inner-liner layers are shown in Table 1.

Tire 1 of the present invention: This tire was formed by the lamination of a thin film of vinylidene chloride-vinyl chloride copolymer (vinylidene chloride 85 mol%) of thickness 20μm to form the inner-liner layer on the inner surface of a green tire, and then the vulcanization of the green tire.

Tire 2 of the present invention: This tire was formed by the coating of a water-based emulsion obtained by a method of emulsion-polymerization of vinylidene chloride and vinyl chloride (copolymer vinylidene chloride rate 85mol%) to form the inner-liner layer on the inner surface of the green tire in such a way that the thickness of the inner-liner layer when dried was approximately 20μm, and then the vulcanization of the green tire.

Comparative tire: This tire was formed by the provision on the inner surface of a green tire, by way of a tie rubber of approximately 700μm thickness, of an inner-liner layer of approximately 500μm thickness configured from a non-vulcanized butyl rubber, and then the vulcanization of the green tire.

Air-leakage test: After mounting of the tires (stationary state) at room temperature 21°C on a standard rim, the tires were let stand for 48 hours at inner pressure 2.0kgf/cm^2, whereupon the inner pressure of the tires was re-adjusted to 2.0kgf/cm^2. Taking the point immediately following re-adjustment as the initial point of measurement, the inner pressure was measured every 48 hours for 3 months.

[Procedural Amendment 8]

[Title of Document Subject to Amendment] Specification

[Item Subject to Amendment] 0013

[Method of Amendment] Alteration

[Details of Amendment]

[0013] The measured data obtained in this way was recursed to $y^{-\beta t}$ by a method of least squares and, taking t = time (days), y = inner pressure (measured inner pressure/2.0), an air leakage coefficient β was obtained. In addition, substituting t = 30 days, an inner pressure reduction rate

(Z) per month was calculated in accordance with the equation noted below.

[Procedural Amendment 9]

[Title of Document Subject to Amendment] Specification

[Item Subject to Amendment] 0017

[Method of Amendment] Alteration

[Details of Amendment]

[0017] In addition, using the method for the manufacture of the pneumatic tire of the present invention, by the lamination of a thin film formed from a vinylidene chloride-vinyl chloride copolymer or the spraying or coating of a water-based emulsion of the vinylidene chloride-vinyl chloride copolymer as an inner-liner layer in advance on the inner surface of the green tire configured from a non vulcanized rubber, and then the vulcanization of the green tire, an excellent tire like that described above can be manufactured without the need for the use of a tie rubber.